

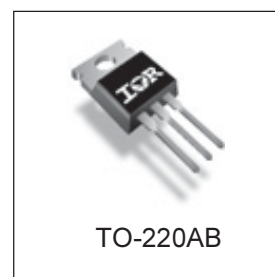
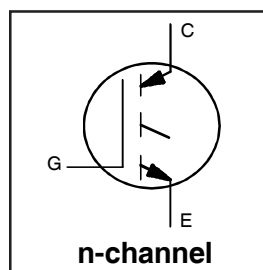
PDP TRENCH IGBT

IRGB4055PbF

Features

- Advanced Trench IGBT Technology
- Optimized for Sustain and Energy Recovery circuits in PDP applications
- Low $V_{CE(on)}$ and Energy per Pulse (E_{PULSE}^{TM}) for improved panel efficiency
- High repetitive peak current capability
- Lead Free package

Key Parameters		
$V_{CE\ min}$	300	V
$V_{CE(on)}\ typ.\ @\ 110A$	1.70	V
$I_{RP}\ max\ @\ T_C = 25^{\circ}C\ ①$	270	A
$T_J\ max$	150	$^{\circ}C$



Description

This IGBT is specifically designed for applications in Plasma Display Panels. This device utilizes advanced trench IGBT technology to achieve low $V_{CE(on)}$ and low E_{PULSE}^{TM} rating per silicon area which improve panel efficiency. Additional features are 150 $^{\circ}C$ operating junction temperature and high repetitive peak current capability. These features combine to make this IGBT a highly efficient, robust and reliable device for PDP applications.

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{GE}	Gate-to-Emitter Voltage	± 30	V
$I_C\ @\ T_C = 25^{\circ}C$	Continuous Collector Current, $V_{GE}\ @\ 15V$	110	A
$I_C\ @\ T_C = 100^{\circ}C$	Continuous Collector, $V_{GE}\ @\ 15V$	60	
$I_{RP}\ @\ T_C = 25^{\circ}C$	Repetitive Peak Current ①	270	
$P_D\ @\ T_C = 25^{\circ}C$	Power Dissipation	255	W
$P_D\ @\ T_C = 100^{\circ}C$	Power Dissipation	102	
	Linear Derating Factor	2.04	W/ $^{\circ}C$
T_J	Operating Junction and	-40 to + 150	$^{\circ}C$
T_{STG}	Storage Temperature Range		
	Soldering Temperature for 10 seconds		
	Mounting Torque, 6-32 or M3 Screw	10lb·in (1.1N·m)	N

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ②	—	0.49	$^{\circ}C/W$

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{CES}	Collector-to-Emitter Breakdown Voltage	300	—	—	V	$V_{GE} = 0V, I_{CE} = 1\text{ mA}$
$\Delta BV_{CES}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.23	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_{CE} = 1\text{ mA}$
$V_{CE(on)}$	Static Collector-to-Emitter Voltage	—	1.10	1.30	V	$V_{GE} = 15V, I_{CE} = 35A$ ③
		—	1.70	2.10	V	$V_{GE} = 15V, I_{CE} = 110A$ ③
		—	2.35	—	V	$V_{GE} = 15V, I_{CE} = 200A$ ③
		—	1.95	—	V	$V_{GE} = 15V, I_{CE} = 110A, T_J = 150^\circ\text{C}$
$V_{GE(th)}$	Gate Threshold Voltage	2.6	—	5.0	V	$V_{CE} = V_{GE}, I_{CE} = 1\text{ mA}$
$\Delta V_{GE(th)}/\Delta T_J$	Gate Threshold Voltage Coefficient	—	-11	—	mV/ $^\circ\text{C}$	
I_{CES}	Collector-to-Emitter Leakage Current	—	2.0	25	μA	$V_{CE} = 300V, V_{GE} = 0V$
		—	100	—		$V_{CE} = 300V, V_{GE} = 0V, T_J = 150^\circ\text{C}$
I_{GES}	Gate-to-Emitter Forward Leakage	—	—	100	nA	$V_{GE} = 30V$
	Gate-to-Emitter Reverse Leakage	—	—	-100		$V_{GE} = -30V$
g_{fe}	Forward Transconductance	—	38	—	S	$V_{CE} = 25V, I_{CE} = 35A$
Q_g	Total Gate Charge	—	132	—	nC	$V_{CE} = 200V, I_C = 35A, V_{GE} = 15V$ ③
Q_{gc}	Gate-to-Collector Charge	—	42	—		
t_{st}	Shoot Through Blocking Time	100	—	—	ns	$V_{CC} = 240V, V_{GE} = 15V, R_G = 5.1\Omega$
E_{PULSE}	Energy per Pulse	—	705	—	μJ	$L = 220\text{ nH}, C = 0.40\mu\text{F}, V_{GE} = 15V$ $V_{CC} = 240V, R_G = 5.1\Omega, T_J = 25^\circ\text{C}$
		—	915	—		$L = 220\text{ nH}, C = 0.40\mu\text{F}, V_{GE} = 15V$ $V_{CC} = 240V, R_G = 5.1\Omega, T_J = 100^\circ\text{C}$
C_{iss}	Input Capacitance	—	4280	—	pF	$V_{GE} = 0V$
C_{oss}	Output Capacitance	—	200	—		$V_{CE} = 30V$
C_{rss}	Reverse Transfer Capacitance	—	125	—		$f = 1.0\text{ MHz}$, See Fig.13
L_C	Internal Collector Inductance	—	5.0	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_E	Internal Emitter Inductance	—	13	—		

Notes:

- ① Half sine wave with duty cycle = 0.25, $t_{on} = 1\mu\text{sec}$.
 ② R_θ is measured at T_J of approximately 90°C .
 ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.

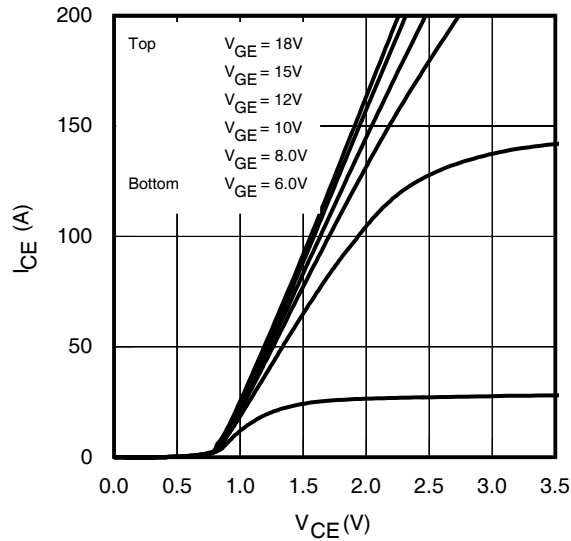


Fig 1. Typical Output Characteristics @ 25°C

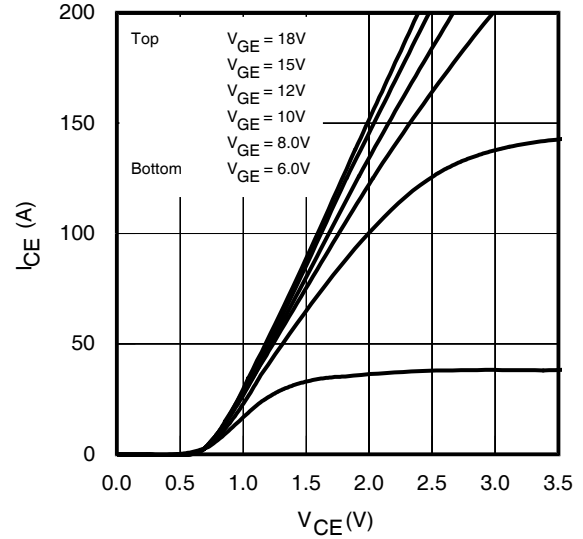


Fig 2. Typical Output Characteristics @ 75°C

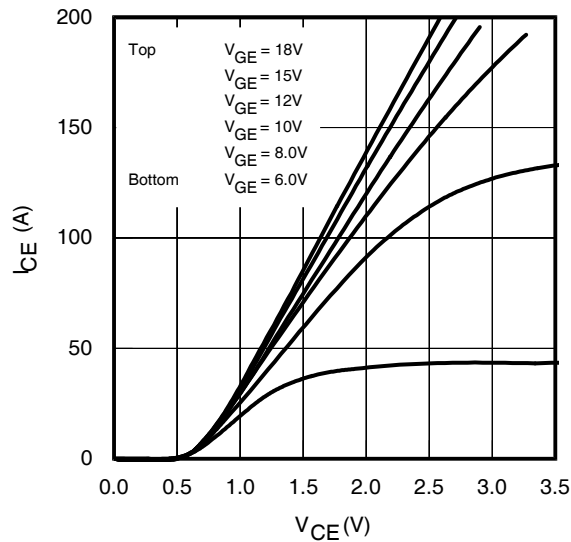


Fig 3. Typical Output Characteristics @ 125°C

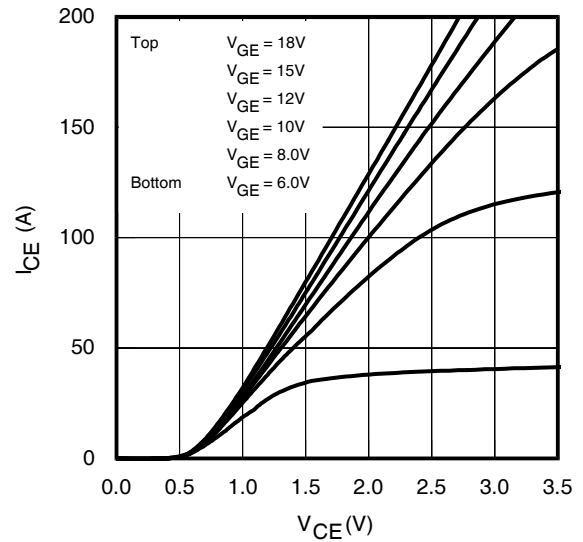


Fig 4. Typical Output Characteristics @ 150°C

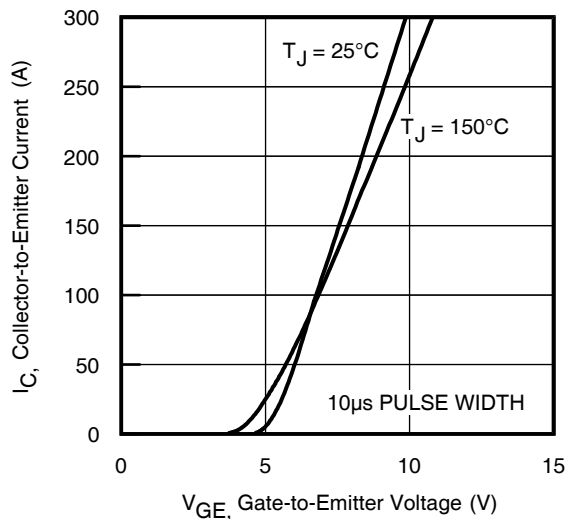


Fig 5. Typical Transfer Characteristics

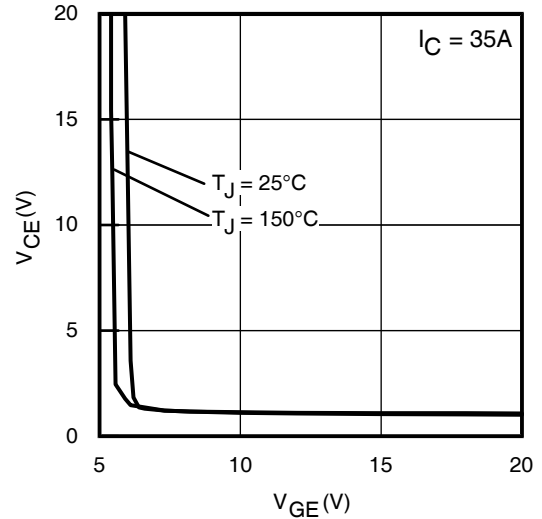


Fig 6. $V_{CE(ON)}$ vs. Gate Voltage

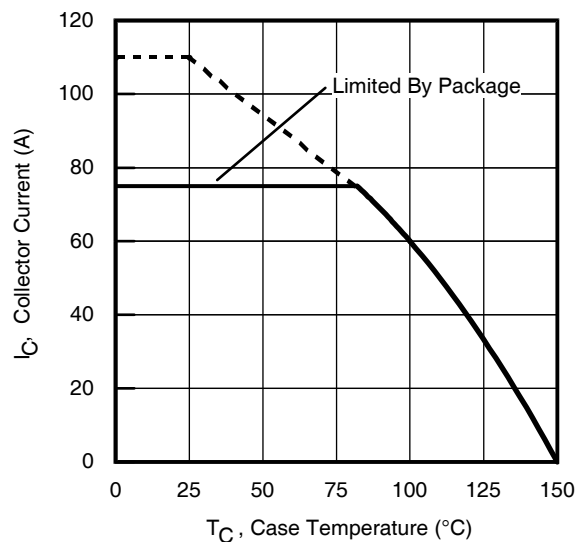


Fig 7. Maximum Collector Current vs. Case Temperature

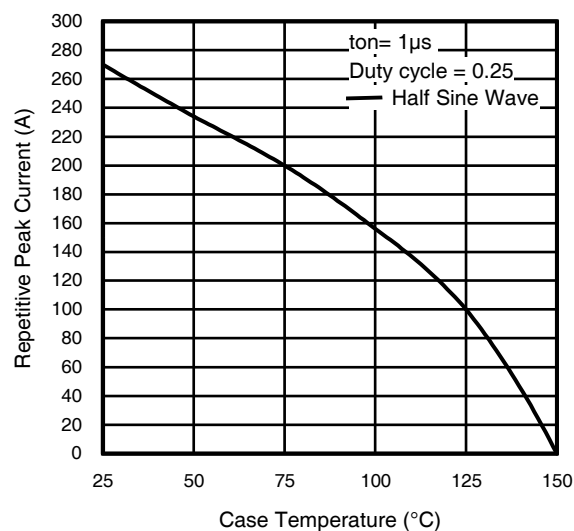


Fig 8. Typical Repetitive Peak Current vs. Case Temperature

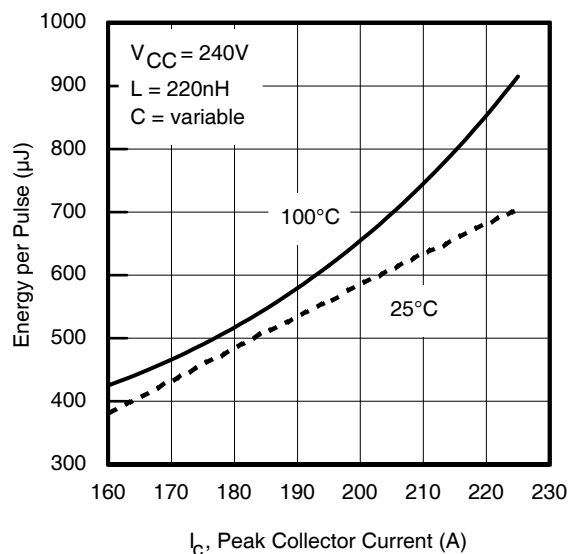


Fig 9. Typical E_{PULSE} vs. Collector Current

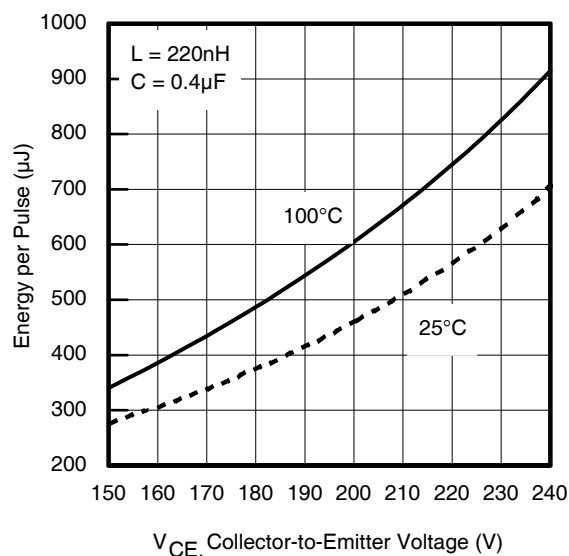


Fig 10. Typical E_{PULSE} vs. Collector-to-Emitter Voltage

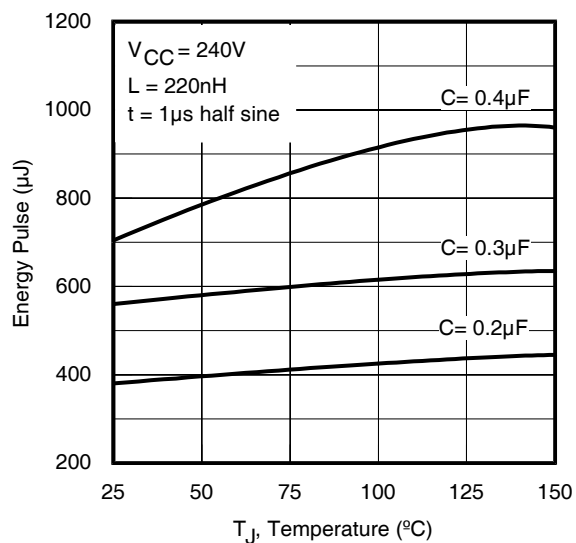


Fig 11. E_{PULSE} vs. Temperature

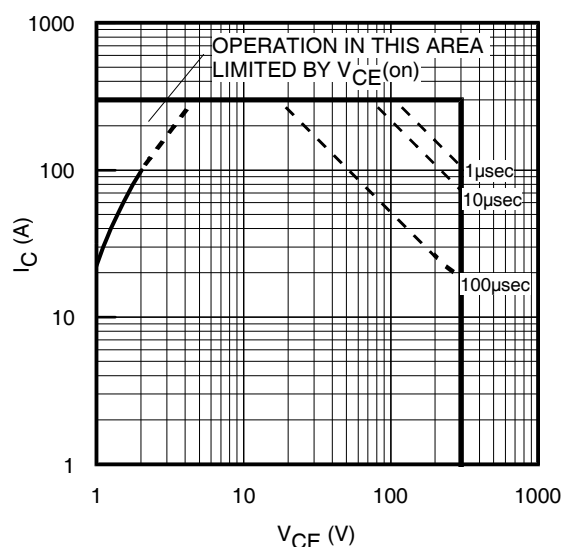
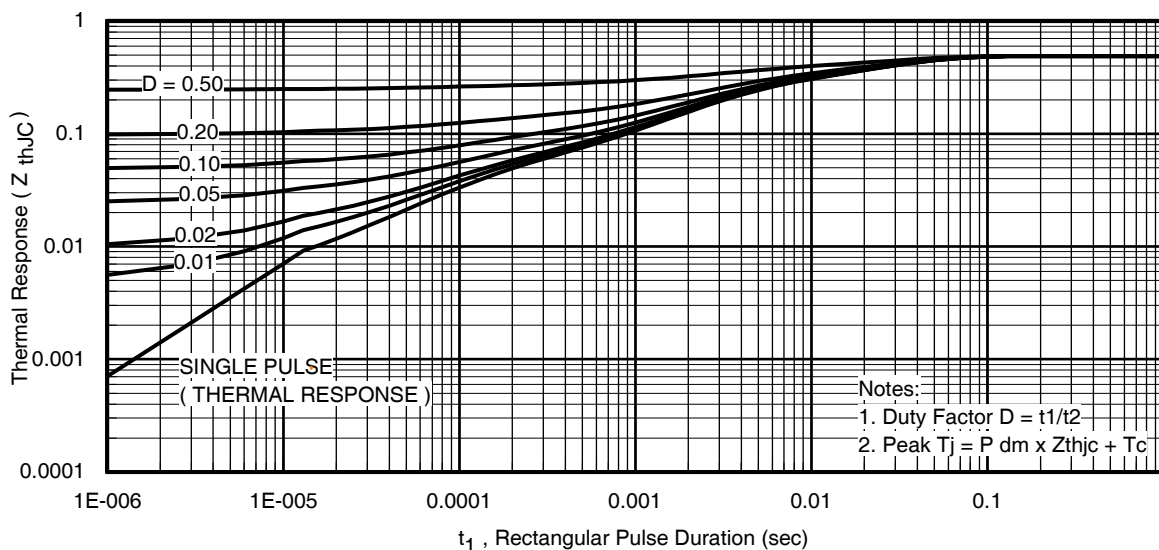
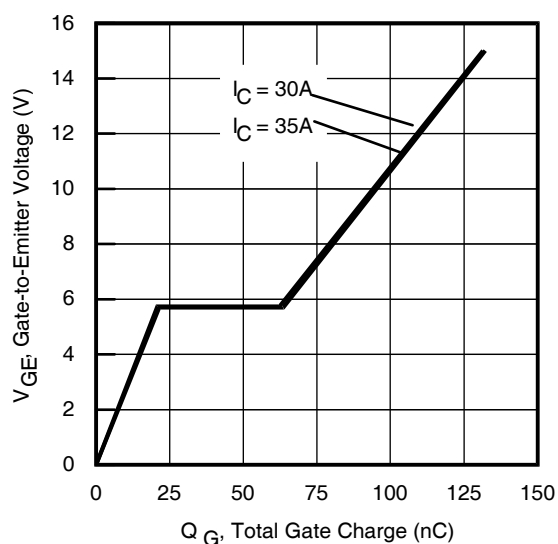
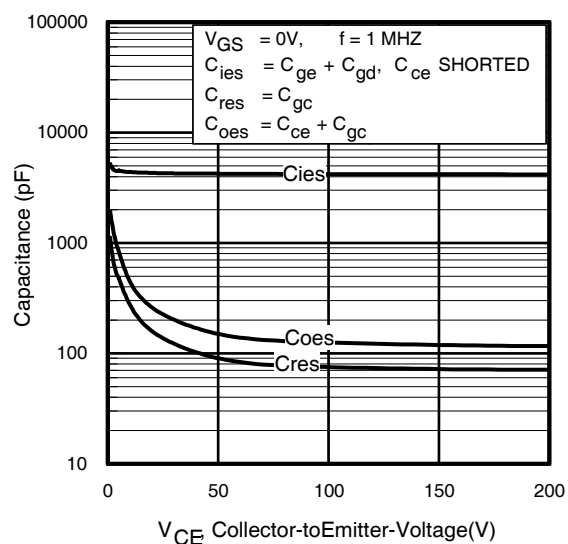


Fig 12. Forward Bias Safe Operating Area



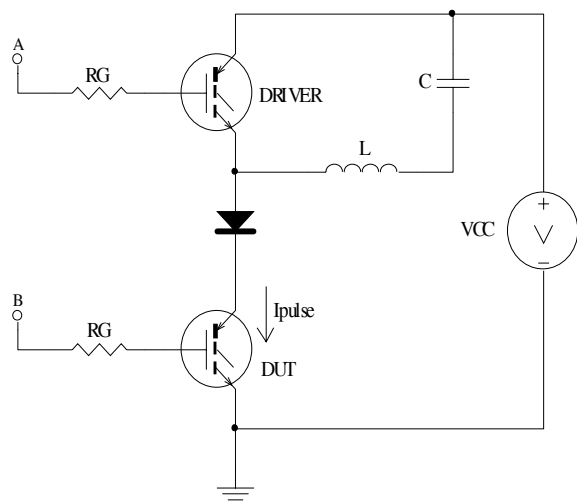


Fig 16a. t_{st} and E_{PULSE} Test Circuit

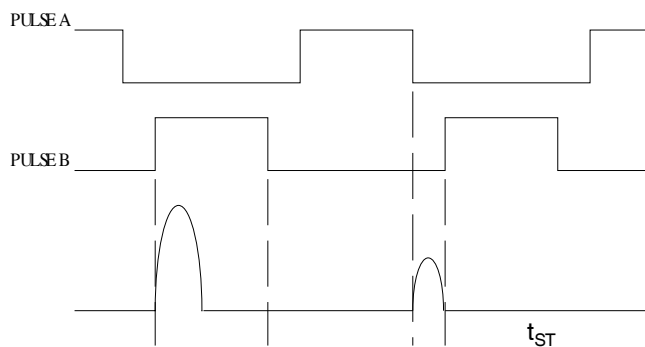


Fig 16b. t_{st} Test Waveforms

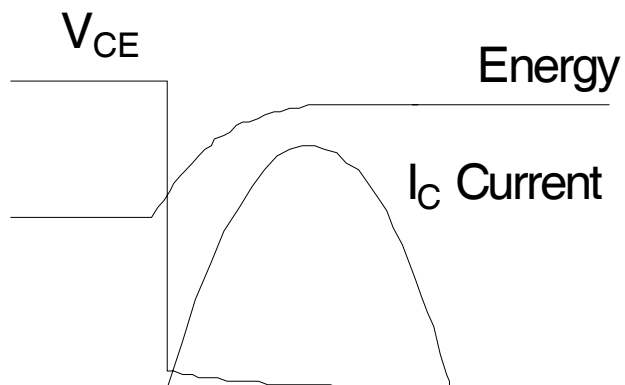


Fig 16c. E_{PULSE} Test Waveforms

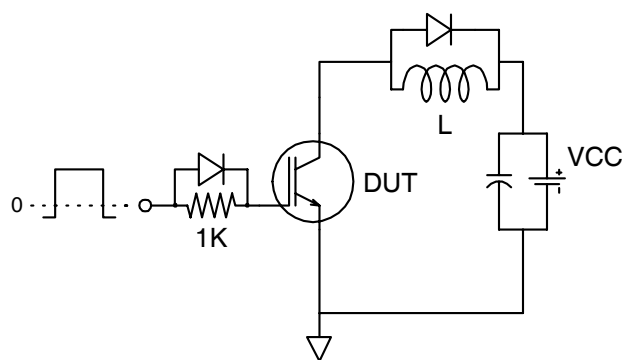
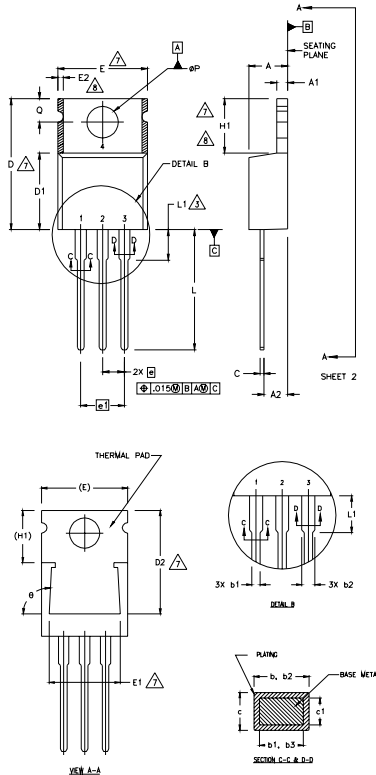


Fig. 17 - Gate Charge Circuit (turn-off)

TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5 M- 1994.
2. DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS).
3. LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
4. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5. DIMENSION b1 & c1 APPLY TO BASE METAL ONLY.
6. CONTROLLING DIMENSION : INCHES.
7. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
8. DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.

LEAD ASSIGNMENTS

HEXKEET

- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE

IGBTs, CoPACK

- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER

DIODES

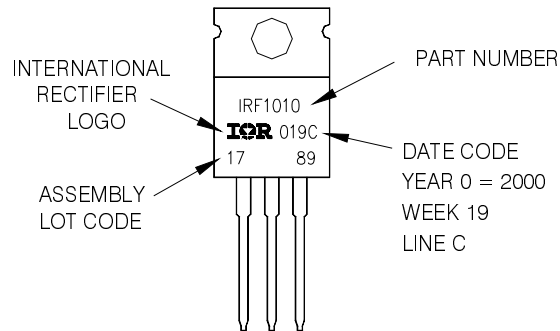
- 1.- ANODE/OPEN
- 2.- CATHODE
- 3.- ANODE

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.82	.140	.190	5
A1	0.51	1.40	.020	.065	
A2	2.04	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.96	.015	.038	5
b2	1.15	1.77	.045	.070	
b3	1.15	1.73	.045	.068	
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	4
D	14.22	16.51	.560	.650	
D1	8.38	9.02	.330	.355	
D2	12.19	12.88	.480	.507	
E	9.66	10.66	.380	.420	7, 7
E1	8.38	8.89	.330	.350	
e	2.54 BSC		.100 BSC		7, 8
e1	5.08		.200 BSC		
H1	5.85	6.55	.230	.270	3
L	12.70	14.73	.500	.580	
L1	-	6.35	-	.250	
ØP	3.54	4.08	.139	.161	
Q	2.54	3.42	.100	.135	90°-93°
ø	90°-93°		90°-93°		

TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010
LOT CODE 1789
ASSEMBLED ON WW 19, 2000
IN THE ASSEMBLY LINE "C"

Note: "P" in assembly line position indicates "Lead - Free"



TO-220AB package is not recommended for Surface Mount Application.

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